CLAIMS:

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent is:

1. A system for detecting optical signals in optical networks comprising:

optical signal generator for generating optical signals, each optical signal having a peaked spectrum function including a center wavelength for transmission over a communication channel;

a mechanism for applying a dither modulation signal at a dither modulation frequency to said optical signal about said center wavelength;

a wavelength-locked loop servo-control circuit for detecting a rate of change of an intensity of said dither modulated optical signal with respect to said center wavelength, said detected rate of change indicating a degree of optical attenuation in a communication system at said wavelength, said wavelength-locked loop servo-control circuit enabling real-time adjustment of said optical signal center wavelength in a manner so as to minimize optical signal attenuation in said communication channel.

2. The system for detecting optical signals as claimed in Claim 1, wherein said wavelength-locked loop servo-control circuit comprises:

a mechanism for converting said dither modulated optical signal into an electric feedback signal;

a mechanism for detecting a signal at said dither modulation frequency from said electric feedback signal, said signal comprising said rate of change of an intensity of said dither modulated optical signal;

a control device for determining an attenuation of said communication channel based on said rate of change of an intensity of said dither modulated optical signal and generating a control signal representative of said degree of attenuation; and,

a mechanism responsive to said control signal for adjusting the peak spectrum function of said optical signal in order to minimize an amount of optical signal attenuation in said channel.

3. The system for detecting optical signals as claimed in Claim 2, wherein said rate of change of an intensity of said dither modulated optical signal is a first derivative of optical intensity with respect to a center wavelength, said detecting mechanism comprising a lock-in amplifier for locking said signal at said dither modulation frequency.

4. The system for detecting optical signals as claimed in Claim 3, wherein said rate of change of an intensity of said dither modulated optical signal is a second derivative of optical intensity with respect to a center wavelength, said detecting mechanism comprising a lock-in amplifier for locking a signal at two times said dither modulation frequency.

5. The system for detecting optical signals as claimed in Claim 2, wherein said communication channel includes a wavelength selective device for receiving and transmitting said dither modulated optical signal, said wavelength selective device exhibiting a peaked passband function including a center wavelength, wherein said adjusting mechanism automatically aligns a center wavelength of said optical signal with a center wavelength of said peaked spectrum function of said wavelength selective device.

6. The system for detecting optical signals as claimed in Claim 5, wherein said adjusting mechanism comprises a level control device for receiving said control signal and dynamically adjusting an input bias signal for said optical generator, said center wavelength of said optical signal being adjusted in accordance with said input bias current changes.

7. The system for detecting optical signals as claimed in Claim 2, wherein said detecting mechanism includes a mixer device capable of combining said detected signal at said dither modulation frequency with said applied dither modulation signal and generating said control signal indicating said degree of attenuation.

8. A method for detecting optical signals in optical networks comprising the steps of:

a) generating optical signals, each optical signal having a peaked spectrum function including a center wavelength for transmission over a communication channel;

b) applying a dither modulation signal at a dither modulation frequency to said optical signal about said center wavelength;

c) detecting a rate of change of an intensity of said dither modulated optical signal with respect to said center wavelength, said detected rate of change indicating a degree of optical attenuation in a communication system at said wavelength; and,

d) enabling real-time adjustment of said optical signal center wavelength in a manner so as to minimize optical signal attenuation in said communication channel.

9. The method as claimed in Claim 8, wherein said detecting step c) comprises the steps of:

converting said dither modulated optical signal into an electric feedback signal;

extracting a signal locked at said dither modulation frequency from said electric feedback signal.

12 ~~10~~. The method as claimed in Claim 8, wherein said adjusting step d) comprises the steps of:

determining an attenuation of said communication channel based on said rate of change of an intensity of said dither modulated optical signal;

generating a control signal representative of said degree of attenuation; and,

adjusting the peak spectrum function of said optical signal in order to minimize an amount of optical signal attenuation in said channel.

10 ~~11~~. The method for detecting optical signals as claimed in Claim 9, wherein said rate of change of an intensity of said dither modulated optical signal is a first derivative of optical intensity with respect to a center wavelength, said extracting step including locking a signal at said dither modulation frequency.

11 ~~12~~. The method as claimed in Claim 9, wherein said rate of change of an intensity of said dither modulated optical signal is a second derivative of optical intensity with respect to a center wavelength, said extracting step including locking a signal at two times said dither modulation frequency.

13. The method as claimed in Claim ~~10~~ 12, wherein said communication channel includes a wavelength selective device for receiving and transmitting said dither modulated optical signal, said wavelength selective device exhibiting a peaked passband function including a center wavelength, wherein said adjusting step comprises automatically aligning a center wavelength of said optical signal with a center wavelength of said peaked spectrum function of said wavelength selective device.

14. The method as claimed in Claim 13, wherein said adjusting step comprises the steps of: receiving said control signal and dynamically adjusting an input bias signal for said optical generator, said center wavelength of said optical signal being adjusted in accordance with said input bias current changes.

15. A system for detecting optical signals in optical networks, said optical network including a receiver portion for receiving said optical signals transmitted over a communications channel, said system comprising:

optical signal generator for generating optical signals, each optical signal having a peaked spectrum function including a center wavelength;

a tunable wavelength selective device for receiving optical signals transmitted over said communication channel, said wavelength selective device nominally exhibiting a peaked passband function including a center wavelength;

mechanism for applying a dither modulation signal to said wavelength selective device for dithering said peaked passband function of said tunable wavelength selective device about said center wavelength, said dither modulated tunable wavelength selective device causing generation of a modulated optical signal at said dither modulation frequency;

a wavelength-locked loop servo-control circuit for detecting a rate of change of an intensity of said dither modulated optical signal with respect to said center wavelength, said detected rate of change indicating a degree of optical attenuation in said communication channel at said wavelength, said wavelength-locked loop servo-control circuit enabling real-time center wavelength adjustment of said peaked passband function of said tunable wavelength selective device in a manner so as to minimize optical signal attenuation in said communication channel.

16. The system for detecting optical signals as claimed in Claim 15, wherein said wavelength-locked loop servo-control circuit comprises:

a mechanism for converting said dither modulated optical signal into an electric feedback signal;

a mechanism for detecting a signal at said dither modulation frequency from said electric feedback signal, said signal comprising said rate of change of an intensity of said dither modulated optical signal;

a control device for determining an attenuation of said communication channel based on said rate of change of an intensity of said dither modulated optical signal and generating a control signal representative of said degree of attenuation; and,

a mechanism responsive to said control signal for tuning said wavelength selective device in a manner so as to align said peaked passband function of said wavelength selective device with a center frequency of said transmitted optical signal.

17. The system for detecting optical signals as claimed in Claim 16, wherein said rate of change of an intensity of said dither modulated optical signal is a first derivative of optical intensity with respect to a center wavelength, said detecting mechanism comprising a lock-in amplifier for locking said signal at said dither modulation frequency.

18. The system for detecting optical signals as claimed in Claim 16, wherein said rate of change of an intensity of said dither modulated optical signal is a second derivative of optical intensity with respect to a center wavelength, said detecting mechanism comprising a lock-in amplifier for locking a signal at two times said dither modulation frequency.

19. The system for detecting optical signals as claimed in Claim 16, wherein said tuning mechanism comprises a level control device for receiving said control signal and dynamically adjusting a center wavelength of said peaked passband function of said tunable wavelength selective device in accordance with said control signal.

20. A method for detecting optical signals in optical networks, said optical network including a receiver portion for receiving said optical signals transmitted over a communications channel, said method comprising steps of:

a) generating optical signals, each optical signal having a peaked spectrum function including a center wavelength;

b) providing a tunable wavelength selective device for receiving optical signals transmitted over said communication channel, said wavelength selective device nominally exhibiting a peaked passband function including a center wavelength;

c) applying a dither modulation signal to said wavelength selective device for dithering said peaked passband function of said tunable wavelength selective device about said center wavelength, said dither modulated tunable wavelength selective device causing generation of a modulated optical signal at said dither modulation frequency;

d) detecting a rate of change of an intensity of said dither modulated optical signal with respect to said center wavelength, said detected rate of change indicating a degree of optical attenuation in said communication channel at said wavelength; and,

e) enabling real-time center wavelength adjustment of said peaked passband function of said tunable wavelength selective device in a manner so as to minimize optical signal attenuation in said communication channel.

21. The method for detecting optical signals as claimed in Claim 20, wherein said detecting step d) comprises the steps of:

converting said dither modulated optical signal into an electric feedback signal; and,

extracting a signal locked at said dither modulation frequency from said electric feedback signal.

24 ~~22~~. The method for detecting optical signals as claimed in Claim 20, wherein said adjusting step e) comprises the steps of:

determining an attenuation of said communication channel based on said rate of change of an intensity of said dither modulated optical signal;

generating a control signal representative of said degree of attenuation; and,

adjusting the peaked passband function of said tunable wavelength selective device in accordance with said control signal.

~~23~~ 22. The method for detecting optical signals as claimed in Claim 21, wherein said rate of change of an intensity of said dither modulated optical signal is a first derivative of optical intensity with respect to a center wavelength, said extracting step including locking a signal at said dither modulation frequency.

~~24~~ 23. The method for detecting optical signals as claimed in Claim 21, wherein said rate of change of an intensity of said dither modulated optical signal is a second derivative of optical intensity with respect to a center wavelength, said extracting step including locking a signal at two times said dither modulation frequency.

25. The method for detecting optical signals as claimed in Claim ~~22~~ 24, wherein said adjusting step comprises the step of automatically aligning a center wavelength of said peaked passband function with a center wavelength of said peaked spectrum function of said transmitted optical signal.